

LARVAE OF SIX GENERA OF CETONIINAE FROM EASTERN NIGERIA (COLEOPTERA: SCARABAEIDAE)

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The scarabaeid subfamily Cetoniinae is of world-wide distribution and includes many brightly colored and highly variegated beetles from the tropics. In West Africa the group is represented by about 275 species belonging to about 65 genera.

Larvae of several North American species have been described briefly by various writers. The most important work is that of Hayes (1928 and 1929), Bøving and Craighead (1931) and Ritcher (1945). Larvae of British Cetoniinae, *Cetonia aurata* L. and *Potasia cuprea* F., were characterized by Van Emden (1941).

The only paper on African lamellicorn larvae is from South Africa by Oberholzer (1959), where larvae of three genera were described: *Pachnoda impressa* Goldf., *Hypselogenia geotrupina* Billb., and *Diplognatha gagates* Fabric. The larvae are unknown from West Africa.

The food of cetoniid larvae according to Ritcher (1958) is organic matter in the soil, decaying wood or trash and other debris accumulated in the hollows of trees or elsewhere.

In Nigeria larvae of *Heterorrhina smaragdina* were found in decaying portion of a *Kola nitida* tree whereas those of five other species were collected from raphia or oil palm or coconut palm trees at Umudike. The larvae were reared to the adult stage in the laboratory at the Agricultural Research Station in jam jars on decaying raphia stem. The food was changed once a week. Mortality was about five percent.

Cetoniid larvae usually crawl on their backs and become white and sluggish as they approach pupation. The larva then builds a small cell of decaying material and encloses itself. It remains in that condition for 2-3 days before it pupates. Duration of the pupal stage for the various species at room temperature is as follows: *Pachnoda marginella*, 10-14 days; *Clastocnemis quadrimaculatus*, 18-22 days; *Platygenia barbata*, 20-24 days; *Grammopyga cincticollis*, 12-14 days; *Gnathocera trivittata*, 13-15 days; *Heterorrhina smaragdina*, 23-26 days.

In this paper larvae of six species, *Clastocnemis quadrimaculatus*, *Platygenia barbata*, *Gnathocera trivittata*, *Grammopyga cincticollis*, *Heterorrhina smaragdina*, and *Pachnoda marginella* are described for the first time and keys presented for their separation. Larval descriptions of the first five genera have not appeared heretofore. The Nigerian larvae agree with those of British (Van Emden, 1941) and North American (Ritcher, 1945) larvae in essential characters.

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The material studied for this paper is in the collection of the Entomology Department, Agriculture Research Station, Umudike-Umuahia.

Cetoniid larvae may be characterized as follows: Labrum symmetrical; antenna four segmented, first segment longest and the third segment shortest. Ocelli present. Clypeus divided into a small pre- and a large post-clypeus. Mandibles, each with a ventral, oval stridulatory structure consisting of transverse ridges. Maxillary stridulatory teeth with anteriorly directed sharp points; lacinia of each maxilla with a single distal uncus or with two unequal distal unci fused at their bases. Epipharynx with a single nesium; plegmata and prolegmata absent; haptomerum of epipharynx with a conspicuous, transverse curved row of closely placed stout setae. Abdominal segments 1-6, each with three dorsal annulets; segments 7 and 8, each with two dorsal annulets; each annulet with variable rows of setae. Palidia present or absent. Anal slit transverse, often slightly curved.

KEY TO THE THIRD-STAGE LARVAE OF KNOWN SPECIES OF NIGERIAN
CETONIINAE

- 1. Labrum entire; lacinia of maxilla with one terminal uncus; clithra absent (fig. 4); claw falcate (fig. 9); raster without longitudinal palidia (fig. 12)----- 2
Labrum trilobed; lacinia of maxilla with two terminal unci fused at their bases (fig. 5); clithra present (fig. 3); claw sub-conical or cylindrical and rounded apically (fig. 8); raster with two longitudinal palidia (fig. 13)----- 3
- 2. Distal segment of antenna with four sensory spots; dorso-epicranial setae one long and one short on each side (fig. 1); ninth and tenth abdominal segments not fused dorsally (fig. 10)----- **CLASTOCNEMIS QUADRIMACULATUS**
Distal segment of antenna with 13-17 sensory spots; dorso-epicranial setae 2 long and a row of 7-8 short on each side; ninth and tenth abdominal segments fused dorsally ----- **PLATYGENIA BARBATA**
- 3. Claw cylindrical and rounded apically with more than 8 setae ----- 4
Claw sub-conical with six setae ----- **GNATHOCERA TRIVITTATA**
- 4. Scissorial area of left mandible with S_{1+2} , S_3 and S_4 and of right mandible with S_{1+2} and S_{3+4} ; laeotorma of epipharynx divided and shaped like an inverted V; each palidium of raster with 9-11 pali ----- **GRAMMOPYGA CINCITICOLLIS**
Scissorial area of left mandible with S_1 , S_2 , S_3 and S_4 (fig. 6) and of right mandible with S_{1+2} , S_3 and S_4 (fig. 7); laeotorma of epipharynx sub-triangular; each palidium of raster with 12 or more pali ----- 5
- 5. Distal segment of antenna with 10-11 sensory spots; each palidium of raster with 12-13 pali ----- **HETERORRHINA SMARAGDINA**
Distal segment of antenna with five sensory spots; each palidium of raster with 15-17 pali (fig. 13)----- **PACHNODA MARGINELLA**

Clastocnemis quadrimaculatus Afzel
(Figs. 1, 4, 10 and 12)

MATERIAL STUDIED: Six third-stage larvae and a cast skin of a third-stage larva reared to the adult stage. These larvae, together with several others, were collected from coconut palms at Akwete on January 11, 1962 by M. L. Jerath. The reared adults were determined by Mr. R. D. Pope of British Museum, London.

Three third-stage larvae associated with one adult were collected from coconut palm at Umudike on July 24, 1962 by M. L. Jerath.

DESCRIPTION: Maximum width of head capsule of third-stage larva 2.64-3.04 mm. Surface of cranium reticulate and yellowish-brown in color. Frons, on each side, with a single long posterior frontal seta and a single long seta in anterior angle; other frontal setae absent. Dorso-epicranial setae one long and two or three microsensillae. Last antennal segment with four sensory spots. Clithra absent. Scissorial

area of the left mandible with S_1 , S_2 , S_3 , and S_4 and of the right mandible with S_{1+2} , S_3 and S_4 . Lacinia of maxilla with a single terminal uncus; maxillary stridulatory area with a row of 4-5 anteriorly pointed teeth and a distal conical process.

Prothoracic spiracle 0.32-0.36 mm. long and 0.20-0.24 mm. wide. Spiracles of abdominal segments 1-7 similar in size, those of abdominal segment eight slightly smaller.

Segments nine and ten separate dorsally and each segment with two to three rows of setae. Raster without palidia. Teges consisting of numerous, caudally directed rather short flattened setae, laterally interspersed with several very long cylindrical setae. Lower anal lip with scattered short flattened setae similar to those of the teges. Claws falcate, sharp pointed, and each with two short setae.

Platygenia barbata Afzel

(FIG. 9)

MATERIAL STUDIED: Three third-stage larvae were collected from oil palms at Agriculture Research Station, Umudike by M. L. Jerath. The reared adults were identified by Mr. R. D. Pope of British Museum, London.

DESCRIPTION: Maximum width of head capsule of third-stage larvae 7.19-7.65 mm. Surface of cranium reticulate and reddish-orange in color with small brown spots. Frons bearing on each side, 2 long and 6-7 short posterior frontal setae, 1 to 2 long and 3-4 short exterior frontal setae, 1 to 2 short anterior frontal setae and a single long anterior frontal seta. Dorsoepicranial setae 9-10 on each side, two long and the rest very short and in a row. Last antennal segment with 13-17 sensory spots. Labrum entire. Clithra absent. Scissorial area of left mandible with S_{1+2} and S_{3+4} , and of right mandible with S_{1+2} and S_{3+4} . Lacinia of maxilla with a single terminal uncus. Maxillary stridulatory area with a row of 4-6 anteriorly pointed teeth and a distal conical process.

Prothoracic spiracle 0.96-1.08 mm. long and 0.76-0.84 mm. wide; spiracles of abdominal segments 1-7 similar in size and those of segment eight slightly smaller.

Dorsa of segments nine and ten fused, but covered with numerous setae. Raster without palidia. Tegillar setae scattered on the venter of tenth abdominal segment and the lower anal lip. Claws falcate, sharp pointed, and each with two short setae.

Gnathocera trivittata Swed.

MATERIAL STUDIED: Three third-stage larvae reared from the eggs laid during January 1962 in the laboratory by confining beetles to soil rich in organic matter. (No. U62-5.)

DESCRIPTION: Maximum width of the head capsule of third-stage larva 2.40-2.52 mm. Surface of cranium smooth and light-yellow in color. Frons with a shallow median longitudinal depression forked anteriorly and extends forward from the epicranial stem. Frons on each side, with a single long posterior frontal seta and a single long seta in anterior angle. Dorso-epicranial setae one long and nine short on each side. Last antennal segment with 7-8 sensory spots. Clithra present. Scissorial area of left mandible with S_{1+2} , S_3 and S_4 and of right mandible with S_{1+2} and S_{3+4} . Lacinia of maxilla with two terminal unci fused at their bases, dorsal uncus much the larger. Maxillary stridulatory area with a row of six to eight stridulatory teeth pointing anteriorly and a small distal conical process.

Prothoracic spiracle .38-.32 mm. long and 0.28-0.22 mm. wide. Spiracle of abdominal segments 1-7 similar. Those of abdominal segment 8 slightly smaller.

Dorsa of abdominal segments nine and ten fused and covered with numerous short

and long setae. Raster with a pair of palidia and a pair of tegilla. Each palidium is a row of 11-13 stout blunt pali. The palidia being almost parallel. Septula narrow, about four times longer than broad. Tegilla composed of short to long straight sharp pointed setae united anterior to palidia; lower anal lip with tegilla setae. Claw sub-conical, bearing 6 stout setae.

Grammopyga cincticollis Hope

MATERIAL STUDIED: Several third-stage larvae were collected from decaying raphia palm trees at Umudike on January 4, 1963 by M. L. Jerath. The associated adults were determined by Mr. R. D. Pope of British Museum, London.

Three third-stage larvae and cast skins of two larvae were reared to the adult stage. Larvae were collected from decaying oil palm trees at Umudike on June 21, 1963 by B. O. Bassey.

DESCRIPTION: Maximum width of head capsule of third stage larva 2.90-2.96 mm. Surface of cranium smooth and yellowish-brown in color. Frons with a shallow median longitudinal depression forked anteriorly and extending from the epicranial stem. Frons on each side, with a single long posterior frontal seta and a single long seta in anterior angle. Dorso-epicranial seta one on each side with 1-2 microsensillae. Last antennal segment with four sensory spots. Clithra present. Scissorial area of left mandible with S_{1+2} , S_3 and S_4 and of right mandible with S_{1+2} and S_{3+4} . Lacinia of maxilla with two terminal unci fused at their bases, dorsal uncus larger. Maxillary stridulatory area with a row of 7-8 stridulatory teeth pointing anteriorly and a distal conical process.

Prothoracic spiracle .36-.44 mm. long and .32-.28 mm. wide. Spiracles of abdominal segments 1 to 8 similar in size.

Dorsa of abdominal segments nine and ten fused but covered with numerous short setae. Raster with a pair of palidia and a pair of tegilla. Each palidium consists of a single close-set row of 9-11 rather stout blunt pali. The two palidia join anteriorly and are parallel posteriorly or slightly diverging. Tegilla composed of short to long straight sharp pointed setae united anterior to palidia. Lower anal lip with tegillar setae. Claw cylindrical, rounded apically and bearing 8-9 short setae.

Heterorrhina smaragdina Voet

MATERIAL STUDIED: Three third-stage larvae and a cast skin of one third-stage larva were reared to the adult stage, collected from decaying part of *Kola nitida* tree at Agriculture Research Station, Umudike by M. L. Jerath on March 29, 1961.

DESCRIPTION: Maximum width of head capsule of third-stage larva 3.60-3.68 mm. Surface of cranium smooth and yellowish-brown in color. Frons on each side, with one long posterior frontal seta and a long seta in anterior angle, other frontal setae absent. Dorsoepicranial setae, one long and 2-3 short on each side. Last antennal segment with 9-11 sensory spots. Clithra present. Scissorial area of left mandible with S_1 , S_2 , S_3 and S_4 and of right mandible with S_{1+2} , S_3 and S_4 . Lacinia of maxilla with two terminal unci, fused at their bases, dorsal uncus larger. Maxillary stridulatory area with five maxillary teeth pointing anteriorly and a distal conical process.

Prothoracic spiracle .48-.52 mm. long and .32-.36 mm. wide. Spiracles of abdominal segments 1-7 similar in size but those of abdominal segment 8 slightly smaller.

Dorsa of abdominal segments nine and ten fused, but covered with numerous short and long setae. Raster with a pair of palidia and a pair of tegilla. Each palidium consists of a single row of 12-13 stout and blunt pali, the two palidia join anteriorly

and are parallel posteriorly. Septula about three times longer than broad. Tegilla composed of short to long straight sharp pointed setae united anterior to palidia; lower anal lip with tegillar setae. Claw cylindrical, rounded apically, bearing 14-15 short setae.

Pachnoda marginella F.

(FIGS. 2, 3, 5-8, 11 and 13)

MATERIAL STUDIED: Ten third-stage larvae and the cast skins of five third-stage larvae were reared to the adult stage. These larvae, together with several others, were collected from decaying raphia palms at Umudike, on July 6, 1962. The reared adults were determined by Mr. R. D. Pope of British Museum, London.

DESCRIPTION: Maximum width of the third-stage larva 4.43-4.74 mm. Surface of cranium smooth, faintly reticulate and orange brown in color. Frons with a shallow median, longitudinal depression which is forked anteriorly and extends forward from the epicranial stem. Frons on each side, with a single long posterior frontal seta and a single long seta in the anterior angle; other frontal setae absent. Dorso-epicranial setae one long and 8 to 9 short on each side. Last antennal segment with five sensory spots. Clithra present. Scissorial area of left mandible with S_1 , S_2 , S_3 and S_4 and of right mandible with S_{1+2} , S_3 and S_4 . Lacinia of maxilla with two terminal unci fused at their bases, dorsal uncus much the larger. Maxillary stridulatory teeth pointing anteriorly and a small distal conical process.

Prothoracic spiracle 0.80-0.84 mm. in length and 0.56-0.64 mm. in width. Abdominal spiracles similar in size.

Dorsa of abdominal segments nine and ten fused and covered with numerous short and long setae. Raster with a pair of longitudinal palidia; each palidium set with 15-17 short, stout pali, septula elongate to sub-elliptical; tegilla composed of numerous short and long straight sharp pointed setae united anteriorly to the palidia. Lower anal lip with numerous short setae. Claw cylindrical, rounded apically, each with 14-15 setae borne on the sides and near the end of the claw.

The larvae of *P. marginella* can be separated from the larva of *P. impressa* (Oberholzer, 1959) as follows:

Raster with 15-17 pali in each palidium; claw with 14-15 setae-----	MARGINELLA
Raster with 17-20 pali in each palidium; claw with 6-8 setae-----	IMPRESSA

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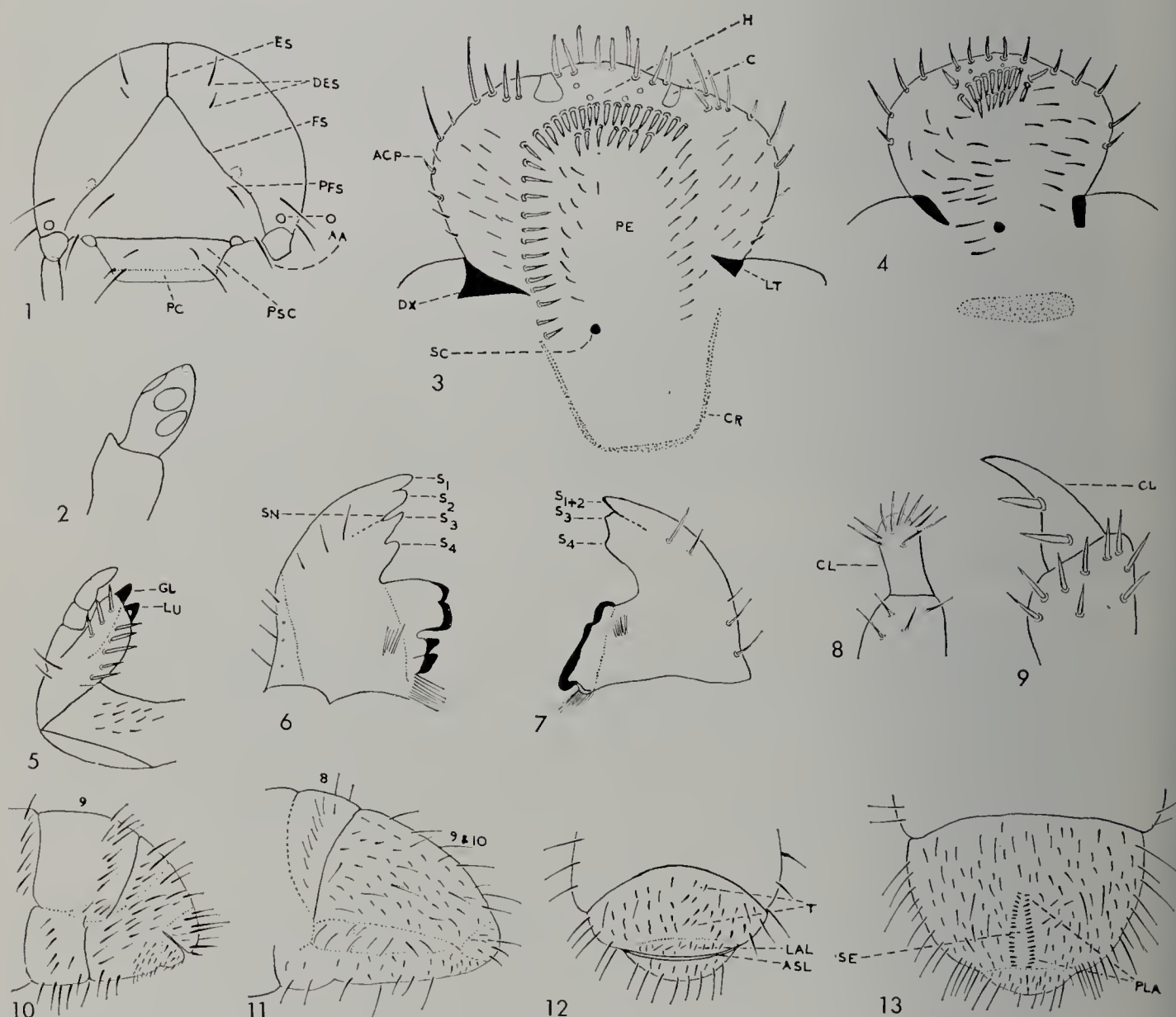
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FIGURES 1-13, Larvae of Cetoniinae.

Clastocnemis quadrimaculatus. 1—Head capsule. 4—Epipharynx. 10—Lateral view of 8th to 10th abdominal segments. 12—Raster.

Pachnoda marginella. 2—Last antennal segment. 3—Epipharynx. 5—Maxilla, ventral view. 6—Left mandible, dorsal view. 7—Right mandible, dorsal view. 8—Claw. 11—Lateral view of 8th to 10th abdominal segment. 13—Raster.

Platygenia barbata. 9—Claw.

SYMBOLS. AA—Seta of anterior angle of frons. ACP—Acanthoparia. AFS—Anterior frontal seta. ASL—Anal slit. C—Clithrum. CL—Claw. CR—Crepis. DES—Dorso epicranial setae. DX—Dexiotorma. ES—Epicranial stem. FS—Frontal suture. GU—Uncus of galea. LAL—Lower anal lip. LT—Laeotorma. LU—Uncus of lacinia. O—Ocellus. PC—Preclypeus. PE—Pedium. PFS—Posterior frontal seta. PLA—Palidium. PSC—Postclypeus. S—Scissorial teeth. SE—Septula. SC—Sense cone. SN—Scissorial notch. T—Teges.